Bibliometric Study of Defence Science Journal during 2012 - 2016

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Abstract:

The present study was carried on 391 scholarly research articles published in 'Defence Science Journal, during the period 2012-2016. The research journal in the area of defence science and technology published from India by the Defence Scientific Information and Documentation Centre (DESIDOC), Delhi. A significant part for the patterns of the year, authorship pattern, geographical distribution of authors and citation analysis. The research is identidy that the maximum of 114 articles contributed in the journal are on three author pattern, followed by 109 articles as two authors pattern. The attempt of quantitative analysis of publications of DSJ journals shows that the journal has maintained a steady pattern in publishing research results. Current study covers Articles, Reviews, Conference papers and Editorials. This Index is available in the DRDO Publications of open access for all users. This research has analyzed and selected only the Defence Science Journal. It is Started in 1949 and up to date of Multidisciplinary research journal in the area of defence science and technology. Journal feature recent progresses made in the field of defence and military support system and new findings gathered the result about the Indian author articles are in the year 2012 are 68 articles published and year 2013 are increased and the growth rate of publications decrease or increased and there is no stable as well as the implication of these findings is discussed.

Objectives: This study makes an analysis of publication year wise, author wise and their growth of articles publication interest by authors.
Methods/Statistical Analysis: The present study was carried on 391 scholarly research articles published in 'Defence Science Journal, during the period 2012-2016. It is mostly confined to examining article distribution patterns of the research articles, authorship pattern, geographical distribution of authors and citation analysis. Data collected through database were analyzed by using different conventional Statistical Tools and expressed as tables, figures, percentages, average, Relative Growth Rate, Doubling time, Degree of Collaboration, Journal Impact Factors, Most cited articles etc.

Findings: From the values of the 5 year block the journal published 391 articles, the number of publications has increased in 2013 (93) and 2016 (91). In the year 2012 is the three authors publication was (27.95%) in 2013 it was (25.80%) the. Single authors publication was (14.71%) in 2012 year. Overall of contribution 25 % belongs to two authors' contribution. Growth of the total number of pages has been 2937 in the study period From this study observed that there has been an increasing and decreasing trend in the quantum of publication.AsMajor Subject wise contribution. Chemical Engineering has been most predominant, followed by Computer Science, Engineering, Physics and Astronomy and Multidisciplinary fields of Defence Science. Articles carry the highest number of citations (858 citation) 21.59%, followed by Engineering (827citations) 20.77%, Engineering (815 citations) 20.47%, Physics and Astronomy (817 citation) 20.52% and Multidisciplinary (663 citations) 16.65%. The year 2012 has recorded the Impact Factor of 0.4651, the year 2013 as 0.581, year 2014 as 0.673, year 2015 as 0.736 and the year 2016 as 0.500. The most of the Impact

Factor in the year are 2015 (0.736). This study find out the majority of the subjects related to chemical engineering followed by other subjects help to contribute the defence science subject and research scientist and increasing the article contribution by india.

Conclusion: The Journal published 391 articles during the period (2012-2016) of study, majority of articles contains references which include journals, books, conference proceedings, etc.

Application/Improvements: This paper mainly analyzed only five years from 2012 to 2016 defence science journal. The scientific information gained from this study could be of immense help in assessing and promoting defence research.

***Keywords*:** Defence Science Journal, Bibliometrics, Publication output, Distribution of Global Impact and Distribution of the Major Subject wise.

1. Introduction:

Bibliometrics is a quantitative analysis used in a research. It is used for studying the situation, Author pattern, collaboration of research, published in the country, communication processes and information flows in various dissemination of information. In 1969 “Bibliometrics” was first coined by Pritchard. The second decade in the developing countries, continuous usage and practice. The term "metrics" used in different names Bibliometric, Scientometric, Librametry, Webometric and Informetrics etc[1]. According to Cole & Eales defined the statistical analysis of the literature. The Hulme used the term “Statistical Bibliography” in 1923. In 1948, the great Library Scientist, "Librametry" is the coined term of Ranganathan. It appeared first and perhaps seemed proper to streamline the services of librarianship. It is to use the citation of the social science citation index, the science citation index or the arts and humanities citation index.

1.1.Defence Science Journal (DSJ):

The significance of this study lies in the identification of discipline pertaining to contributions to defence science. The disciplines as such explained the study could guide to a more desirable understanding of the fast current, probably the future invention The citation analysis for bibliometric study on defence science journal published by Bi-Monthly and peer reviewed, multidisciplinary research journal. This journal under the publication of the defence scientific information and documentation centre[2], defence research and development organization. The major areas of the subjects are covered by defence science and technology. The journal is indexed by Cambridge scientific abstracts, Chemical abstracts, Elsevier databases, Scimago journal ranking, Indian science abstracts, International aerospace abstracts, ProQuest, Google Scholar, DOAJ, Indian science citation index, Omnifile Full-text Mega, Omnifile Full-text Select, and NTIS database, Ulrich’s International Periodical Directory and Web of Science. The analysis is using the software package statistical package for social sciences. The detailed analysis is shown in the following tables and figure.

1.2. Definitions of Bibliometrics:

- **Wikipedia:** It is a written analysis using the statistical analysis for publication of the books or articles.
- **Oxford dictionary**: The applied to statistical analysis of books, articles, or other publications.
- It is applied the mathematics and statistical methods to books and other media of communication[3]**.**
- Counting and analyzing the various faces of written communications. (**Hulme)**
- The publication has used the quantitative evaluation patterns related to communications, along with their authorship **(Sengupta)**

1.3. Laws of Bibliometrics:

- **Lotka's law** defined as the scientific productivity and frequency of publication by authors in a given field[4]
- **Bradford's law** noted the of scatter and determining the number of core journals in any given field[5]**.**

- **Zipf's law** of used the word occurrence and the frequency of words within a text[2].

2.Existing Work:

A literature review is an evaluative report of information found in the literature related to your selected area of this study. Such as; Reported[6] the bibliometric analysis of the journal of Pakistan Medical Association for the year 2009 to 2013. A total number of 913 Original articles were found in regular issues of the journal, while leaving out six special supplements that were published during the period under study. The number of Original articles increased steadily from 148 (16.2%) in 2009 to 214(23.40%) in 2013, In yearly terms, Original articles published each year ranged between 148 and 214; 510 (55.90%) had 21-30 citations; 3-author contributions ranked the highest with 206 (22.60%); 481(52.70%). The authors were geographically affiliated to Sindh, Pakistan; Community Medicine was the most popular medical specialty with was 140(15.3%) articles; 17340(90.5%) citations were from journals; and the most productive institution was Aga Khan University, Karachi. Analyzed[7] the article on "Herald of Library Science: A Bibliometric Science.". It is used in authorship pattern, degree of collaboration and geographical distribution of papers. The study focus the majority of papers was single authored and the degree of collaboration was found to be 0.30. The geographical distribution revealed that the contribution by Andhra Pradesh was the highest in India, while Nigeria was on top in case of foreign countries. Carried[8] out a study on "INSDOC'S Contribution to Bibliometrics". A study the history of bibliometric research and related training activities in INSDOC. It reveals that the objectives, facilities, services, research activities and publication of the National Centre of bibliometrics.

2.1. Research Gap:

Literature on "Bibliometrics" during 2012-2016 a "**Bibliometric Study of the Defence Science Journal"** So far no study of this specific subject has been made the department of Library and information Science[9]**.** The author has chosen the period 2012-2016, Defence Science Journal is selected and soft as well as print format. This Index is available in the DRDO Publications of open access for all users.

3. Objectives of the Study:

The following objective of the study is as follows:

- To analyze the year and articles
- To analyze the Authorship Pattern
- To identify the authorship pattern and collaborative research in the year
- To identify journal publication output in the year
- To analyze the total number of pages
- To identify the geographical distribution of the contributing authors and
- To study the major subject of defence science journal

3.1. Limitation:

The data were collected from the Defence Science Journal. Data analysis was restricted to articles published from 2012-2016.The present study covers Articles, Reviews, conference papers and Editorials.

3.2. Materials and Methods:

The data were collected from defence science journal, from January 2012 to December 2016, this data which give details for five years. Additionally, it covers the records downloaded from the database and analyzed by Hits Biblometric software and Microsoft Excel. Data collected through database were analyzed by using

different conventional Statistical Tools like tables, figures, percentages, average, Relative Growth Rate, Doubling time, Degree of Collaboration, Activity Index, Journal Impact Factors , H-Index, Most cited articles etc.

3.3. Significance of the Study:

- With its essential and intricate research content this study could add to the day to day stock of knowledge with information science help to assessing and promoting defence science research.[2, 7]
- The study could also serve as a model for other bibliometric study.
- It would induce defence scientist, and researcher centres, to improve their performance.
- It could help the scholar of defence science and researcher in becoming aware of the current trends in defence related military research activity.

- The significance of this study lies in the identification of discipline pertaining to contributions to defence science. The disciplines as such explained the study could guide to a more desirable understanding of the fast current, probably the future invention.[8,9]
- This understanding might provide some data which are important for the design and establishment of defence Education Programmes, as well as, to relate this program to the most suitable academic units with department, college, and university.

4. Data Analysis and Findings:

The year wise distribution of the Defence Science Journal Publication during the period of five years 2012 - 2016.The selected in the period of five years.Total 391 papers have contributed during 2012 – 2016.There are the year 2013 has more number of articles published 93(23.78%), 2014 and 2015 has decreased the number of articles and hence the year 2016 has increased (23.28%). The signigicant of the publication of the article has no constant level of increase or decrease. Table [1]

Further analysis shows that the publication of the authorship patteren Vs year wise contribution. The years 2016 is the highest for 31 articles and lowest in the year 2013, has more than five authors only. The authorship was contributed the paper two authors are highly (N=109) and low level publication of th morethan five authors(N=18) only.Table [2]

The distribution of authorship pattern of publications for the year 2012. The totally 68 articles published, three author contribution (N=19) is top level and five authors and Three Authors are both (N=5). The conclude the study has three author punlication of article is 27.95 percent.Table[3]

In the year 2013, distribution of authorship pattern of publications has 93 articles published. The study investigated that three author contribution (N=24) is top level and more than five authors (N=1). The conclude the study has three author punlication of article is 25.80 percent .Table[4]

The distribution of authorship pattern of publications in the year 2014 has 80 articles published. The study reveals that three author contribution (N=30) is top level and four authors (N=1). The conclude the study has three author punlication of article is 37.50 percent and low level publication of the four authors 1.25 prcent.Table[5]

Year 2014 has the distribution of authorship pattern of publications has 59 articles published. The study reveals that two authors contribution (N=23) is top level and single authors (N=3). The conclude the study has two author punlication of article is 38.98 percent and low level publication of the single authors 5.08 prcent.Table[6]

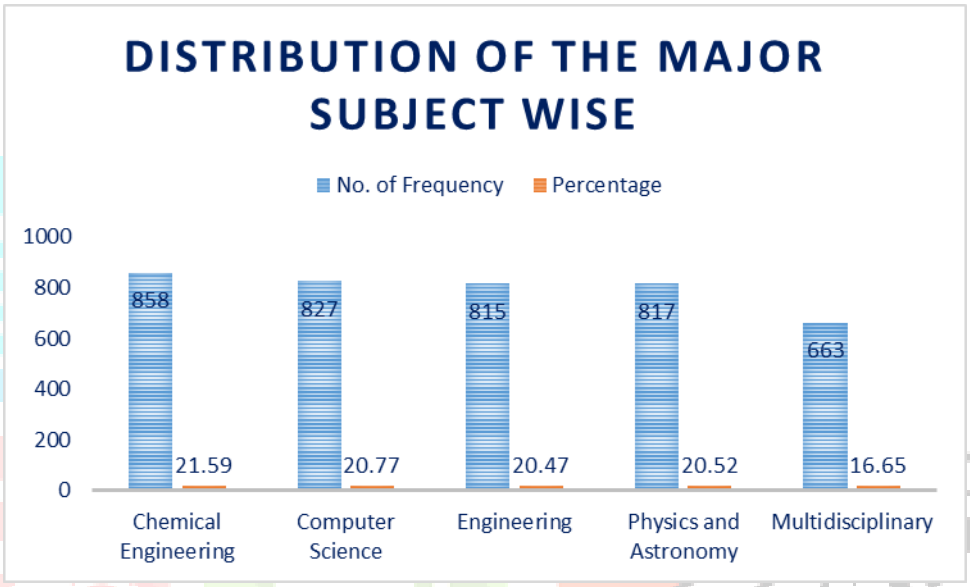
The distribution of authorship pattern of publications has 91 articles published in the year 2016. The study find that three authors contribution (N=31) is top level and more than five authors (N=2). The present

study has three author punlication of article is 34.07 percent and low level publication of the morethan five authors 2.19 prcent.Table[7]

The Authorship pattern during 2012 – 2016 period. Two author contributed article(38.98 percent) in 2014 followed by in 2013, 37.50 percent of three author publication and others.

To summarize, it shows that the distribution of year wise publications Vs Total number of pages. Totally 2937 pages, the higher number of pages in (N=651) has 1-6 pages and in 2015, 493 pages are published the article. The result of number of pages 6 has (N=580) followed by 2 pages (N=518), 4 pages (N=488), 1 pages (N=463), 3 pages (N=459) and 5 pages (N=429). The study found that in 2016, 651 more number of pages 1 - 6 and 6 pages has 580.Table[8]

Figure 1. Distribution of the Major Subject wise



The major subjects has contributedin the maximum papers of the subject inChemical Engineering, (N=858) followed by Computer Science (N=827), Engineering (N= 815), Physics and Astronomy(N= 817) and Multidisciplinary(N= 663) The finding of the study are majority of the subject covered in Chemical Engineering (21.59%).Table[9]

The Allied Subject Category Publication of Polymer Science, Composite Material Composite Materials, (N=104) followed by Physics related Optical and Electro optical, (N=435), Aeronautics of Avionics and Technology(N=206), Armaments of Snow related manifestation, High Energy Material, (N=141), Combat Vehicles (N= 81), and so on.The study reveals that the Engineering related aeronautical and defence science and Electronics are Allied subject category top most priority level (19.44%).Table[10]

It is possess that the papers of Defence and Science Journal Global Impact and Quality Factor. The find out the in the year 2015 (0.736) and average level in the year 2012 (0.461).Table[11]

5. Conclusion:

The Journal published 391 articles during the study period (2012-2016) of study. The maximum number of contributors such as; During the study period, the number of publications has recorded high in 2013 (93) and 2016 (91). The reason of both the years are publication of three authors contribution are high level. In the year 2012 the three authors publication was (27.95%) of the articles are compared to any other authors. The Five and more than five authors has both level (7.35%). In the year 2013 the three authors publish (25.80%) of the articles. The Two authors publish (35%) of the articles over a period of the year 2014. Two authors publish (23%) of the articles over a period of the year 2015. In the year 2016, most of the articles (96.70%) are collaborative in nature. Distribution of Global Impact and Quality Factor. It is in the year 2012 has Impact Factor 0.4651 followed by in the year 2013 has 0.581, year 2014 has 0.673, year 2015 has 0.736 and in the year 2016 0.500. The most of the Impact Factor in the year are 2015 (0.736). Overall this paper discussed five years of publication total number of articles, yearwise, authorwise, Major Subjectwise and Distribution of global impact of this journal articles of the year etc., growth of authors interest of publications, Journals quality imfact factor and their significance discussed clearly.

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Table 1. Distribution of the Year wise Defence Science Journal Publication (2012-2016)

S.No	Year	Number of Articles	Percentage
1	2012	68	17.40
2	2013	93	23.78
3	2014	80	20.46
4	2015	59	15.08
5	2016	91	23.28
	Total	391	100.00

Table 2. Defence science Publication of the Authorship Pattern Vs Year (2012-2016)

No. of Authors	Year					Total	%
	2012	2013	2014	2015	2016		
Single Authors	10	16	7	3	3	39	9.97
Two Authors	17	22	24	23	23	109	27.90
Three Authors	19	24	28	12	31	114	29.20
Four Authors	12	20	11	4	18	65	16.60
Five Authors	5	10	6	11	14	46	11.80
More than Five Authors	5	1	4	6	2	18	4.60
Total	68	93	80	59	91	391	100.00

Table 3. Authorship pattern of publications for the year 2012

S.No	Number of Authors	Total	Percentage
1	Single Authors	10	14.71
2	Two Authors	17	25.00
3	Three Authors	19	27.95
4	Four Authors	12	17.64
5	Five Authors	5	7.35
6	More than Five Authors	5	7.35
Total		68	100.00

Table 4. Authorship pattern of publications for the year 2013

S.No	Number of Authors	Total	Percentage
1	Single Authors	16	17.23
2	Two Authors	22	23.65
3	Three Authors	24	25.80
4	Four Authors	20	21.50
5	Five Authors	10	10.75
6	More than Five Authors	1	1.07
Total		93	100.00

Table 5. Authorship pattern of publications for the year 2014

S.No	Number of Authors	Total	Percentage
1	Single Authors	11	13.75
2	Two Authors	28	35.00
3	Three Authors	30	37.50
4	Four Authors	1	1.25
5	Five Authors	6	7.50
6	More than Five Authors	4	5.00
Total		80	100.00

Table 6. Authorship pattern of publications for the year 2015

S.No	Number of Authors	Total	Percentage
1	Single Authors	3	5.08
2	Two Authors	23	38.98
3	Three Authors	12	20.37
4	Four Authors	4	6.77
5	Five Authors	11	18.64
6	More than Five Authors	6	10.16
Total		59	100.00

Table 7. Authorship pattern of publications for the year 2016

S.No	Number of Authors	Total	Percentage
1	Single Authors	3	3.30
2	Two Authors	23	25.28
3	Three Authors	31	34.07
4	Four Authors	18	19.78
5	Five Authors	14	15.38
6	More than Five Authors	2	2.19
Total		91	100.00

Table 8. Distribution of Year (2012 - 2016) Vs Total Number of Pages

S.No	Year	Total number of Pages						Total	%	Cumulative %
		1	2	3	4	5	6			
1	2012	79	135	63	68	78	89	512	17.43	17.43
2	2013	125	102	106	107	89	206	735	25.02	42.45
3	2014	89	90	130	83	77	77	546	18.60	61.05
4	2015	86	85	77	81	77	87	493	16.78	77.83
5	2016	84	106	83	149	108	121	651	22.17	100.00
Total		**463**	**518**	**459**	**488**	**429**	**580**	**2937**	**100.00**	

Table 9. Distribution of the Major Subject wise

S.No	Name of the Subject	No. of Frequency	Percentage
1	Chemical Engineering	858	21.59
2	Computer Science	827	20.77
3	Engineering	815	20.47
4	Physics and Astronomy	817	20.52
5	Multidisciplinary	663	16.65
	Total	3980	100.00

Table 10. Distribution of Allied Subject Category

S.No	Name of the Allied Subject Category	No. of Frequency	Percentage
1	Polymer Science, Composite Material Composite Materials	104	4.04
2	Physics related Optical and Electro optical	435	16.90
3	Aeronautics of Avionics and Technology	206	8.00
4	Armaments of Snow related manifestation, High Energy Material	141	5.50
5	Combat Vehicles	81	3.13
6	Engineering related aeronautical and defence science	500	19.44
7	Biomedical related to biotechnology etc	99	3.84

8	Computer Science of Quality Engineering	86	3.34
9	Electronics	500	19.44
10	Materials Science	87	3.40
11	Missiles	243	9.44
12	Naval Systems	91	3.53
	Total	2573	100.00

Table 11. Distribution of Global Impact and Quality Factor

Year	Global Impact and Quality Factor
2012	0.461
2013	0.581
2014	0.673
2015	0.736
2016	0.500